

KIDD'S MILL BRIDGE

Spanning Shenango River at Kidd's Mills Road (Township Road
653)

Greenville vicinity

Mercer County

Pennsylvania

HAER PA-622

PA-622

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service

U.S. Department of the Interior

1849 C Street NW

Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

KIDD'S MILL BRIDGE

HAER No. PA-622

LOCATION: Spanning Shenango River at Kidd's Mills Road (Township Road 653),
Greenville vicinity, Mercer County, Pennsylvania
UTM: 17.550346.4578164, Sharpsville, Pennsylvania Quad.

STRUCTURAL
TYPE: Smith truss covered bridge

DATE OF
CONSTRUCTION: 1868

DESIGNER/
BUILDER: Reportedly Smith Bridge Company

PRESENT OWNER: Mercer County, Pennsylvania

PREVIOUS USE: Vehicular bridge

PRESENT USE: Historic landmark and tourist attraction

SIGNIFICANCE: Kidd's Mill Bridge is the oldest and easternmost of twenty extant Smith
truss covered bridges in the United States, and the only known surviving
example of a Type 2 Smith truss.

HISTORIAN: Researched and written by Lola Bennett, November 2003.

PROJECT
INFORMATION: The National Covered Bridges Recording Project is part of the Historic
American Engineering Record (HAER), a long-range program to
document historically significant engineering and industrial works in the
United States. HAER is administered by the Historic American Buildings
Survey/Historic American Engineering Record, a division of the National
Park Service, U.S. Department of the Interior. The Federal Highway
Administration funded the project.

Chronology

- 1787 Pennsylvania becomes the second state admitted to the Union.
- 1805 America's first covered bridge built at Philadelphia.
- 1835 Robert W. Smith born in Miami County, Ohio.
- c1850 Robert D. Kidd builds a mill near this site.
- 1859 Mercer County Commissioners agree to repair existing bridge at this site.
- 1867 Flood destroys bridge at Kidd's Mill.
Robert W. Smith patents Smith truss.
- 1868 Present covered bridge built at Kidd's Mill.
- 1869 Robert W. Smith receives second patent and establishes Smith Bridge Company at Toledo.
- 1891 Smith Bridge Company sold.
- 1898 Robert W. Smith dies.
- 1963 Kidd's Mill Bridge bypassed.
- 1965 Roof and west abutment repaired.
- 1967 Raymond Wilson publishes classification of Smith truss bridges.
- 1974 Kidd's Mill Historical Area listed on the National Register of Historic Places.
- 1979 Kidd's Mill Bridge closed to traffic.
- 1984 Engineering study states Kidd's Mill Bridge is in danger of collapse.
- 1986 Shenango Conservancy formed.
- 1989 Mercer County leases Kidd's Mill Bridge to Shenango Conservancy for ninety-nine years.

- 1990 Kidd's Mill Bridge rehabilitated.
- 1991 Kidd's Mill Bridge Park developed by Shenango Conservancy.
- 2003 Kidd's Mill Bridge recorded by the Historic American Engineering Record.

Introduction

Pennsylvania is the birthplace of the American covered bridge. In 1804 Timothy Palmer, a master carpenter from Massachusetts, built the 500' Permanent Bridge over the Schuylkill River at Philadelphia. Shortly after its erection, at the urging of the bridge company, Palmer weatherboarded and roofed the structure to protect the trusses from the weather, making the Permanent Bridge the first covered bridge in the United States.¹ By 1810, covering timber bridges was conventional practice in America.²

Pennsylvania was also the proving ground for many early timber truss designs, among them several bridges of unprecedented size, such as Lewis Wernwag's 340' Colossus (1812) and Theodore Burr's 360' McCall's Ferry Bridge (1815). These early bridges served as prototypes for thousands of covered bridges that were built across the United States in the nineteenth century. During the height of the covered bridge period (ca.1830-1880), Pennsylvania had an estimated 1,500 covered bridges.³ In the late nineteenth and early twentieth century, the majority of these were lost to decay, flood, arson and progress. Today with 209 examples, Pennsylvania holds the distinction of having the most covered bridges of any state in the United States.⁴

Description

Kidd's Mill Bridge is a single-span Smith truss covered bridge. The total length of the bridge is 122' with a clear span of 118'-6". The truss is 16'-6" high from the top of the upper chord to the bottom of the lower chord and 20'-0" wide overall, with a roadway width of 16'-6".

The upper chord and lower chords are composed of three parallel timbers (6"x10" in the upper chord; 6"x12" in the lower chord), bolted together with shear blocks between them. The chords are connected by vertical 7"x7" endposts and wooden diagonal tension members (7"x7" at centerspan, increasing to 7"x10" at the ends of the span) with wooden compression counter braces (7"x7" at centerspan, increasing to 7"x11" at the ends of the span) intersecting at opposing angles at mid-truss height the full length of the truss. The tension members pass through the chords and the compression members butt up against the tension members near their intersection with the chords. The web members are bolted together at their intersection with each other and with the chord members.

The floor system is composed of 2"x12" transverse wooden floor beams, spaced 1'-9" apart, seated on the lower chord. There is wooden lateral cross bracing (approximately 4"x4") between the lower chords and bridging between the floor beams. There are no stringers. Variable width

¹ Although covered bridges were built at least as early as the fourteenth century in Europe, they were not commonly built until after Palmer used the idea in the United States.

² Henry Grattan Tyrrell, *History of Bridge Engineering* (Chicago: H.G. Tyrrell, 1911), p.121.

³ Richard Sanders Allen, *Covered Bridges of the Middle Atlantic States* (Brattleboro: Stephen Greene Press, 1959), p.51.

⁴ National Society for the Preservation of Covered Bridges, *World Guide to Covered Bridges* database printout, 2002.

plank flooring (2" thick) is laid diagonally on top of the floor beams, with running boards (two lines of four boards laid longitudinally) nailed on top. The ends of the lower chords are seated on bed timbers on top of the abutments.

The truss is braced overhead with tie beams (approx. 6"x8") seated on the upper chord at regular intervals. There are ten sets of lateral overhead cross-bracing along the length of the truss.⁵ The lower ends of the rafters are seated on blocks on the upper chord. Corrugated metal fastened to 2"x4" purlins spaced at 18" on top of the rafters covers the gable roof. There are sway braces between the end posts and the ridge.

Board and batten siding (1"x12" boards and 1"x3" battens) covers the exterior of the bridge to approximately 3' below the eaves. The sheathing is fastened to 3"x4" nailers attached to wood blocks on the outer faces of the trusses. The portals have square openings with clipped corners and angle forward over the approaches.

The abutments are built of dry laid, cut sandstone and appear to be original. Behind the abutments, stone wingwalls angle back along the inclined approaches to the bridge. The area around the bridge has been developed as a park with a picnic area and hiking trails. The approaches to the bridge have been barricaded, but the structure is accessible to bikes and pedestrians.

History

In the 1850s, Robert D. Kidd established a mill near this site. The road and crossing were established sometime between 1848 and 1860, when they appear on G.M. Hopkins' "Map of Mercer County, Pennsylvania."⁶ No documentation has been found concerning the first bridge at this location, except that it was repaired in 1859.⁷

In February 1867 a flood destroyed the bridge at Kidd's Mill. The present covered bridge was reportedly built the following year. No records have been found concerning its construction. Two courthouse fires at the turn of the century reportedly destroyed the Mercer County records. There are also no local newspapers from the late 1860s.

Kidd's Mill Bridge carried traffic for over a century. In the early 1960s, the covered bridge was bypassed and slated for demolition by the Commonwealth of Pennsylvania, but Mercer County adopted a resolution to maintain the structure as an historic landmark. Kidd's Mill Bridge continued to carry local traffic until 1979, when an overloaded vehicle fractured several truss members and rendered the bridge unsafe. In 1989, Mercer County leased the bridge for ninety-nine years to the Shenango Conservancy, a local non-profit organization. In 1990 the

⁵ This bridge lacks the slightly overlapped upper lateral bracing that is a distinctive feature of later Smith trusses. It may be a transitional form or was modified at a later date.

⁶ William McKeam's 1848 "Map of Mercer County, Pennsylvania" shows no roads at this location; it does show the road and crossing at Kidd's Mill.

⁷ *Mercer County Commissioners Records*, 1859.

Conservancy rehabilitated the structure and currently maintains it as an historic landmark and tourist attraction.

Design

Robert Smith was born in 1833 in Miami County, Ohio. The son of a cabinetmaker, he learned carpentry as a young man. In his late twenties, Smith ran a woodworking machine shop and lumberyard in Tippecanoe City, Ohio, with his brother. Smith eventually turned his attention to bridges and, in 1867, received a patent for his version of a double-intersection Warren truss.⁸ He subsequently organized the Smith Bridge Company at Toledo. The company built Smith, Howe and Warren trusses, and Smith's business increased rapidly, from five bridges in 1867 to seventy-five bridges in 1869.⁹ In 1869, Smith received a second patent for roofing and lateral-bracing systems.

The Smith truss was designed specifically to compete with iron by using timber as efficiently as possible, and for a decade it was highly successful. Historians estimate that several hundred Smith trusses were built in nine states, being most popular in Ohio, Indiana, California and Oregon.¹⁰ The cost-effectiveness of iron led to the abandonment of the Smith truss design in the 1880s, but Smith's company made the transition and continued to build bridges until 1891. Robert Smith died in 1898 at the age of 63.

⁸ T. Allen Comp and Donald Jackson, "Bridge Truss Types: A Guide to Dating and Identifying," *History News* 32 (May 1977).

⁹ *Ibid.*

¹⁰ In 1967, Raymond Wilson of Pennsylvania classified Smith truss variations as follows:

Smith Type 1	1867 patent	Vertical posts in center panel
Smith Type 2	1869 patent	Opposing diagonals meet in center panel
Smith Type 3	1869 patent	Opposing diagonals cross in center panel
Smith Type 4		Double diagonals and single counters; used for longer spans

In 2003, Matthew Reckard of Indiana suggested that Type 4 "is problematic" and should not be used; instead, the number of sets of diagonals should be noted. Reckard also raises the possibility that at least one covered bridge previously identified as a Warren truss, Feedwire Road Bridge (1870) at Carillon Park in Dayton, Ohio, may actually be a "Smith Type 2 single truss." [See HAER No. OH-127, Salt Creek Bridge.]

Surviving Smith Truss Covered Bridges

05-44-03	Powder Works Bridge	Santa Cruz County, CA	1872	180' Smith 4 truss	Pacific Bridge Co.
14-85-02	North Manchester Bridge	Wabash County, IN	1872	150' Smith 4 truss	Smith Bridge Co.
14-17-01	Spencerville Bridge	DeKalb County, IN	1873	160' Smith 4 truss	John McKay
14-34-01	Vermont Bridge	Howard County, IN	1875	111' Smith 3 truss	
14-26-01	Old Red Bridge	Gibson County, IN	1875	170' Smith truss	W.T. Washer
14-26-03	Wheeling Bridge	Gibson County, IN	1877	164' Smith truss	W.T. Washer
14-60-01	Cataract Falls Bridge	Owen County, OH	1876	140' Smith truss	Smith Bridge Co.
38-43-01	Kidd's Mill Bridge	Mercer County, PA	1868	124' Smith 2 truss	Smith Bridge Co.?
35-40-08	Crabtree Bridge	Jackson County, OH	1870	74' Smith truss	J.G. Stengall
35-40-11	Buckeye Furnace Bridge	Jackson County, OH	1871	59' Smith 3 truss	Dency, McCurdy & Co.
35-40-08	Byer Bridge	Jackson County, OH	1872	74' Smith 3 truss	T.J. Dency
35-71-02	Buckskin Bridge	Ross County, OH	1873	99' Smith truss	Smith Bridge Co.
35-73-15	Otway Bridge	Scioto County, OH	1874	127' Smith 3 truss	Smith Bridge Co.
35-08-23	North Pole Road Bridge	Brown County, OH	1875	169' Smith truss	Smith Bridge Co.
35-64-84	Mary Ruffner Bridge	Perry County, OH	1875	78' Smith 3 truss	
35-84-28	Rinard Bridge	Washington County, OH	1876	130' Smith 3 truss	Smith Bridge Co.
35-29-03	Engle Mill Road Bridge	Greene County, OH	1877	146' Smith 3 truss	
35-29-15	Stevenson Road Bridge	Greene County, OH	1877	98' Smith 3 truss	Smith Bridge Co.
35-08-04	Brown Bridge	Brown County, OH	1878	146' Smith truss	Smith Bridge Co.
35-08-34	George Miller Bridge	Brown County, OH	1879	154' Smith truss	John Griffith

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ADDENDUM TO:
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PHOTOGRAPHS

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